AMENDMENTS TO THE DRAWINGS

The attached sheets 1 and 2 include changes to Figures 2A, 2B, 4, and 5.

Figures 4 and 5 have been amended to include the reference character 14 that refers to backing plates, as described on page 6, paragraph 67 of the specification. Figures 2A and 2B have been labeled "Prior Art."

Attachment: Replacement Sheet(s)

REMARKS

The amendments set out above and the following remarks are believed responsive to the points raised by the Office Action dated September 10, 2004. In view of the amendments set out above and the following remarks, reconsideration is respectfully requested.

The Pending Claims

Claims 1, 7-9, and 11 have been amended and claims 12-20 have been added to describe the invention more clearly. No new matter has been added, and the basis for the amended claim language may be found within the original specification, claims and drawings.

The amendment to claim 1 is supported at, for example, paragraph [0044]; paragraph [0060] and by Figures 2A and 3A. New claim 12 is supported by original claims 1 and 4. New claim 16 is supported by original claims 1 and 6. New claim 20 is supported by original claims 1, 4, and 6.

Allowable Subject Matter

Applicant is pleased to note the Office Action indicates claims 6-11 to be allowable if rewritten in independent form including the limitations of the base claim and any intervening claims.

The Office Action

For convenience, the following remarks will address the comments and rejections in the same order they were raised in the Office Action.

Drawings

In the Office Action, the drawings were objected to under 37 C.F.R. 1.83(a) on the grounds that the drawings did not show backing plates for reinforcing circular holes, as set forth in claim 6. Figures 2A and 2B were also requested to be labeled "Prior Art".

Figures 4 and 5 have been amended to include the reference character 14 that refers to backing plates, as described in paragraph [0067] of the specification. Figures 2A and 2B have been labeled "Prior Art," as requested in the Office Action. Replacement drawing sheets are enclosed.

It is believed that the enclosed amendments to the drawings overcome the objection to the drawings under 37 C.F.R. 1.83(a), and it is respectfully requested that the objection be withdrawn.

Claim Rejections under 35 U.S.C. § 102(b)

Claims 1-5 were rejected under 35 U.S.C. § 102(b) as anticipated by U.S. Patent No. 5,680,738 to Allen et al. (hereinafter, "Allen"). Claims 1, 2, and 4 were rejected under 35 U.S.C. § 102(b) as anticipated by U.S. Patent No. 5,375,547 to Abe et al. (hereinafter, "Abe").

Each of these rejections is respectfully traversed. However, in order to expedite prosecution, claim 7 has been rewritten as an independent claim including the limitations of claim 1. Newly submitted independent claim 16 includes the limitations of claims 1 and 6, and independent claim 20 has been added to include the limitations of 1, 4 and 6.

The Office Action indicated that Allen disclosed a mechanically welded structure in Figures 9 and 10 having a first flat metallic structural element **108** extending in a plane and delimited by a straight edge on one side and a second metallic structural element **112** welded to the straight edge of the first structural element. The Office Action indicated that the second structural element exerts a force that has a component extending perpendicular to the straight edge. The Office Action also indicated that the first structural element has a stress-relieving slit **120** extending parallel to, and arranged in the immediate vicinity of, the straight edge.

Claim 1 encompasses a mechanically welded structure comprising, *inter alia*, a first structural element having a stress-relieving slit extending parallel to the straight edge and *situated facing the point at which the force is exerted.* The second element exerts, at at least one point of the straight edge, a force resolving into at least one component extending in the plane perpendicular to the straight edge. As shown in Figure 1 of the specification, point **151** at which force **F** is applied corresponds to the point of intersection of first and second structural elements **10** and **20** (See also Figures 8a-8c).

Regardless of whether the second structural element in Allen is considered to be the right column flange **112** or the beam **102**, the slots in Allen are not situated facing the point where the force is exerted, as presently claimed.

Assuming that the beam **102** in Allen is the second structural element, the slots **120** and **130** are not situated facing the point at which the force is exerted, i.e., the point of intersection of the beam **102** and column **100** (see Figure 9). In fact, Allen specifies that the center of lower hole of the slot **122** be preferably 1 inch from the upper continuity plate **106** (col. 9, lines 42-43), and that this upper continuity plate **106** is coplanar with upper beam flange **114** (col. 9, lines 20-21) (see also, Figure 9). The slots **120** and **130** are therefore not situated facing the point at which the force is exerted, i.e. the point of intersection of the beam **102** and column **100.** On the contrary, Allen explicitly specifies that the slots **120** and **130** *not* be placed at the claimed location in teaching that the lower end of the slot should be placed 1 inch from this point.

Claim 1 also requires that at least one edge of the claimed stress-relieving slit be *flex to allow the stress-relieving slit to open in response to the force* exerted by the second structural element. Nowhere does Allen disclose that at least one edge of the stress relieving slit flexes to allow the slit to open under the force exerted by the second structural element, as claimed.

The present invention is especially well-suited for use in ships carrying liquefied natural gas (see specification, paragraph [0004]). The weld seams in the mechanically welded structure are subjected to stress when the tank is filled with gas, the temperature decreases, and the membranes of the tank contract, pulling the anchoring bars to the interior of the cell. This problem is exacerbated by swells of the sea (see specification, paragraphs [0005]-[0009]).

By having the slit situated facing the point at which the force is exerted by the second structural element, and by having the stress relieving slit flex to allow the slit to open under the effect of the force, the presently claimed invention is better suited than Allen to solve the stress problem. These features allow the dimensions of the first structural element to vary in a direction perpendicular to the straight edge, i.e., in the direction where the second structural element exerts a force. Structural integrity of the tank is thereby maintained under such mechanical stress.

For example, Figure 7 depicts a liquefied natural gas transport ship containing partitioned cells, a partition having a wall **51** as an intermediate element, a stiffener **52** as a first structural element, and an anchoring element **62** as a second structural element (see paragraph [0018]). If the partitioned cell is subjected to low temperatures, as when it is being filled with liquefied natural gas, the membranes **61** shrink, pulling the anchoring elements inward [0008]. The opening of the slits 12 compensates for this reduction in size so that the total dimension of the structure, as measured by walls **51**, does not change.

The structure disclosed in Figure 9 of Allen would not be able to maintain the stress in vertical beam **100** in the situation described above. The slots **120** and **130** would not allow the dimension of the web **108** to vary in a transverse direction (parallel to beam **102**) in the zone facing the point where beam **102** exerts a force. The locations of the slots are on both sides of the area where beam **102** is welded, but are not *facing* beam **102**. Thus, the flexibility of the web **108** is not increased in the zone facing beam **102**.

Furthermore, beam **100** of Allen is reinforced by continuity plates **106** and **116**, which are coplanar with flanges **114** and **118** of the horizontal beam **102**. The function of the continuity plates is to increase the rigidity of beam **100** in the area of the junction with beam **102**. In contrast to the presently claimed invention, these continuity plates increase the rigidity of the zone of web **108** facing the point at which beam **102** exerts a force (see Figure 9 and column 4, lines 43-63).

Thus, the structure in Allen was not designed to increase the flexibility of the part of the web **108** facing beam **102**. The slots **120** and **130** reduce stress in only a limited area of the beam **100**. Their role is not to increase the flexibility of the part of the web **108** facing beam **102**, as presently claimed, because it would be inconsistent with adding continuity plates **106** and **116** on the structure. Those plates tend to increase the rigidity of web **108**.

Assuming that the column flange **112** is the second structural element, the slots **120** and **130** are still not situated at the point at which the force is exerted. The slots **120** and **130** are not situated at the point at which the force is exerted. Paragraphs [0040]-[0042] and Figures 2A and 2B show that the zone situated around point **151**, which is the intersection of between first and second structures **10** and **20**, has the highest amount of stress and is the point at which the force in claim 1 is exerted. The stresses on the weld seam of the second structural element **20** progressively decrease roughly concentrically, moving away from point **151.**

Claim 1 requires that the slit be situated facing this point at which said force is exerted. There is nothing in Allen that indicates that these slots are situated at point **151**, which is where the stress is the highest. There is nothing in Allen to indicate that the slots are situated facing at least one point of the straight edge at which point force is exerted perpendicular to the straight edge by the second structural element, as presently claimed.

Because Allen does not disclose the claimed flexibility of the slit or the claimed position of the slit, Allen does not anticipate any of claims 1-5.

Turning to the rejection over Abe, the Office Action indicated that Abe shows a mechanically welded structure (Figure 9) having a first flat metallic structural element extending in a plane and delimited by a straight edge on one side, and a second metallic structural element **37** welded to the straight edge of the first structural element. The Office Action indicated that the second structural element is capable of exerting a force perpendicular to the first metallic structural element as a result of forces acting on the second structural element, one of the forces being the result of thermal expansion or contraction. The Office Action also indicated that the first structural element has a stress-relieving slit **17** extending parallel to, and arranged in the immediate vicinity of, the straight edge.

The ports **17** in Abe are liquid passing ports (col. 9, lines 22-24) in a liquefied natural gas storage tank whose function is to let liquid flow from one side of the member **14** to the other side. These ports **17** are not stress-relieving slots and there is no disclosure in Abe that they are situated to reduce stress in the area of the structure that is exposed to high levels of stress, as in the presently claimed invention. Abe discloses that the liquid passing ports are located in the member **14** at "desired positions." This location means that the positions of the liquid passing ports are chosen to allow the liquid of the tank to flow freely and to recover most of the liquid. Abe does not disclose any reason to believe that the position of the liquid passing ports that allows the liquid to pass through corresponds to the positions of the slot that would face the point at which the force is exerted by the second structural element, as presently claimed.

Furthermore, Abe does not disclose that the shell **37** exerts a force on member **14** at a point facing port **17** and that one edge of the lot *flexes to allow slot 17 to open* under the effect of the force, as required by claim 1. Since the slots in Abe are liquid passing ports, rather than stress-relieving slits, there is no reason for them to be flexible as claimed, and there is no disclosure of this flexibility in Abe.

Since Allen does not disclose the claimed flexibility of the slit or the claimed position of the slit, Allen does not anticipate claim 1.

New independent claim 12 contains the limitations of claims 1 and 4 and is patentable over both Allen and Able. Claim 12 is directed to a mechanically welded structure comprising, *inter alia*, a first structural element having a stress-relieving slit extending parallel to the straight edge and situated facing the point at which the force is exerted, the first structural element having a shape elongated in a direction parallel to the straight edge, *the first structural element having, perpendicular to the direction, a first dimension at the location of the point at which the force is exerted, the stress-relieving slit having, according to the direction, a length greater than the first dimension.*

The length of the stress relieving slit with regard to the width (first dimension) of the first structural element makes the proximal edge of the slit flexible and likely to open when a force is exerted on the straight edge of the first structural element (see paragraphs [0059] and [0060]). As described above, the ability of the slit to open enables the welded structure to maintain its structural integrity in the face of mechanical stress, as described above.

In Figure 9 of Allen, the length of the slots **120** and **130** are shorter, not longer, than the width of web **108**. Likewise, Figure 9 of Abe shows that the length of port **17** is shorter than the height of member **14**. Thus, Abe and Allen do not disclose the limitation of new claim **12** that the stress-relieving slit has a length greater than the first dimension of the first structural element. Therefore, claim 12 is patentable over Abe and Allen.

New claim 16 contains the limitations of claims 1 and 6. According to new claim 14, the first structural element has a stress-relieving slit extending parallel to the straight edge and situated facing the point at which said force is exerted, the stress-relieving slit having two opposite ends and *two circular holes at the opposite end, and backing plates reinforcing the first structural element around the circular holes.*

The backing plates around the holes of the slit decrease the level of stress around the holes, and make it possible to cut a longer slit in the first structural member. The flexibility of the proximal edge of the slit is increased when the slit is longer (see paragraphs [0066]-[0067]).

In Allen, the rounded ends of slots **120** and **130** are not surrounded by backing plates. Nor does Abe disclose backing plates around its port **17**. Since Allen and Abe do not disclose backing plates, new claim 16 is patentable over Allen and Abe.

New claim 20 includes the limitations of new claims 12 and 16, i.e. claims 1, 4 and 6. New claim 20 is patentable over both Abe and Allen for the reasons described above.

Conclusion

In view of the amendments and remarks recited herein, the application is considered in good and proper form for allowance, and the Examiner is respectfully requested to pass this application to issue.

If, in the opinion of the examiner, a telephone conference would expedite the prosecution of the subject application, the Examiner is invited to call the undersigned attorney.

Respectfully submitted,

Stephanie M. Lawley

Stephanie M. Lawley, Registration No. 55,362
LEYDIG, VOIT & MAYER
700 Thirteenth Street, N.W., Suite 300
Washington, DC 20005-3960
(202) 737-6770 (telephone)
(202) 737-6776 (facsimile)

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